
Impact of ozone pollution on chemical communication in a highly specialized plant-pollinator interaction

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Abstract

Volatile organic compounds (VOC) play a key role in the relationship between plants and their abiotic and biotic environments. For instance, pollinators usually rely on floral scents to locate their host plants. This chemical communication between plant and pollinator can be disturbed by exposure to pollutants such as ozone (O₃), whose levels have increased in the troposphere and are predicted to further increase over the coming decades. In the present study, we evaluated the impact of O₃ concentration on different steps of the chemical communication between the dioecious Mediterranean fig, *Ficus carica*, and its highly specific pollinating wasp, *Blastophaga psenes*. Firstly, using gas chromatography coupled with electroantennographic recordings and behavioral tests, we found that a particular ratio of three VOC is sufficient to attract *B. psenes* to the inflorescences of *F. carica*. Secondly, using gas chromatography coupled with mass spectrometry, we analyzed the VOC emitted by the inflorescences of *F. carica* in several localities in the French Mediterranean region. Our results revealed that the concentration of O₃ the day of collection affects significantly the VOC emitted by the inflorescences, particularly the VOC used by the pollinator to find its host plant. Finally, using behavioral tests in the laboratory, we observed that the exposure of *B. psenes* to O₃ impairs its attraction towards the attractive mixture of VOC. These results demonstrate that O₃ pollution has the potential to alter the chemical communication between plants and pollinators, and therefore the crucial ecosystem services provided by pollinators.

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